



CHAPTER 1

INTRODUCTION

It is essential for the well-being of the nation that the energy resources of the country be used effectively and efficiently. For Thailand, coal is the only fossil fuel available in sufficient quantities which, if developed properly, could reduce dependence on petroleum imports.

Increased development of coal requires solutions to technical problems associated with mining, processing, transporting, and utilization. Many directions for coal processing, including liquefaction and gasification, have been proposed. Another one, the genesis of this project, is the direct mixing of solid coal particles with liquids fuels known as "Coal-Oil Mixture". This approach is attractive in the short run because it could replace a sizeable percentage of petroleum use in oil-fired power plants with minimum modifications to the furnace.

The most important requirements of coal-oil mixture are that they be pumpable and readily atomized in the furnace. This essentially determines slurry rheology and stability because pumping and atomization characteristics are governed respectively, by the rheological properties of the fuel while storage is related to stability of the slurry.

The purpose of this work is to study the rheological property and stability of coal-oil mixture fuels by using coal and fuel oil in Thailand, also to identify major factors that influence the rheological property and to find the most effective additives. It is expected that this work of coal-oil mixture be a guide to the behavior and the feasibility of a coal-oil mixture plant by using coal and fuel oil in Thailand.

The scope of this research work is as followings:

1. To study the properties of coal, fuel oil and coal-oil mixture: proximate analysis; ultimate analysis; heating vaule and pour point.

2. To study the effect of the factors that influence the rheological property of coal-oil mixtures:

2.1 Effect of coal concentration range : 10-50 wt%

2.2 Effect of coal types:subbituminous and bituminous coal and fuel oil types: heavy and light fuel oil

2.3 Effect of particle size of powdered coal: 90-106 microns; 75-90 microns and -75 microns.

2.4 Effect of temperature range : 40-80 C

3. To study the stability of coal-oil mixtures by measuring stability in term of SR (Sedimentation ratio)

4. To study the combustion phenomena by Thermal analysis (Thermogravimetry analysis).

The important of this work is to provide the properties of coal-oil mixtures, rheological data on coal-oil mixture and relation of parameters to rheological properties, e.g. flow curve models etc. and the most effective additives for coal-oil mixture.